PATENT APPLICATION
Do. No. 2522-011
Client No. AW7007US/YW

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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| In re application of: | Yeong-Kwang KIM, et al. | | |
| Serial No. | 09/872,203 | Examiner: | Maldonado, Julio J. |
| Filed: | May 31, 2001 | Group Art Unit: | 2823 |
| For: | METHOD OF FORMING A THIN USING ATOMIC LAYER DEPOSITION | | |
| Confirmation: | 1930 | | |

**TRANSMITTAL LETTER**

Mail Stop Issue Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Enclosed for filing in the above-referenced application are the following:

☒ Publication and Issue Fee
☒ Applicant's Comments on Examiner's Statement of Reasons For Allowance
☒ In connection with issuance of a patent:
☐ Supplemental Declaration ☒ PTO Form 85B
☒ PTO Form 2038 authorizing credit card payment for the above-listed fees
☒ Any deficiency or overpayment should be charged or credited to deposit account number 13-1703.

**Customer No. 20575**

Respectfully submitted,

MARGER JOHNSON & McCOLLOM, P.C.

Scott A. Schaffer
Reg. No. 38,610

MARGER JOHNSON & McCOLLOM, P.C.
1030 SW Morrison Street
Portland, OR 97205
503-222-3613

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop Issue Fee Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450
Date: June 23, 2004

Li Mei Vermilya

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## APPLICANT'S COMMENTS ON EXAMINER'S STATEMENT OF REASONS FOR ALLOWANCE

Applicant submits that the prior art alone or in combination does not teach a method of forming a thin film using atomic layer deposition (ALD), comprising: providing a reactor having a single reaction space; concurrently loading a batch of substrates into the single reaction space of the reactor; introducing a gas containing reactants into the single reaction space, and chemically adsorbing a portion of the reactants on top surfaces of the substrates within the single reaction space; diluting non-chemically adsorbed reactants in the single reaction space; and removing non-chemically adsorbed reactants from the single reaction space, wherein said introducing the gas containing reactants is performed at a first pressure and said diluting is performed to a second pressure, and wherein the second pressure is greater than the first pressure, as recited in allowed claims 1. Applicant submits that the prior art alone or in combination does not teach a method of forming a thin film using atomic layer deposition (ALD), comprising: providing a semiconductor substrate into a reactor; introducing a gas containing reactants into the reactor at a first pressure, and chemically adsorbing a portion of the reactants on the substrate surface; diluting non-chemically adsorbed reactants in the reactor such that the pressure of the reactor is increased to a second pressure; and removing the diluted non-chemically adsorbed reactants from the reactor, as recited in allowed claim 9. Applicant submits that the prior art alone or in

combination does not teach A method of forming a thin film using ALD, comprising: providing a plurality of wafers into a single reactor; introducing gaseous reactants into the single reactor at a first pressure, and chemically adsorbing a portion of the reactants on top surfaces of the plurality of substrates; diluting non-chemically adsorbed reactants in the single reactor to a second pressure; and removing the diluted non-chemically adsorbed reactants from the single reactor, wherein said second pressure is greater than the first pressure, as recited in allowed claim 16. Applicant submits that the prior art alone or in combination does not teach an atomic layer deposition (ALD) method of forming a thin film layer, comprising: a) inserting one or more semiconductor substrates into a chamber; b) introducing a first gaseous reactant into a reactor at a first pressure, and chemically adsorbing a portion of the reactants on the surfaces of the one or more substrates; c) diluting non-chemically adsorbed first reactants in the reactor by injecting an inert gas into the chamber to increase the pressure of the reactor than the first pressure; d) removing the non-chemically adsorbed first reactants from the chamber; e) introducing a second gaseous reactant into the reactor at a second pressure to form a single atomic layer by chemical exchange; f) diluting non-chemically adsorbed reactants in the reactor such that the pressure of the reactor is increased; and g) removing the non-chemically adsorbed reactants from the chamber, as recited in allowed claim 27. Applicant submits that the prior art alone or in combination does not teach a method of forming a thin film, comprising: (a) providing a reactor having a single reaction space; (b) concurrently loading the plurality of wafers having a processing surface into the reaction space, wherein the processing surfaces of the wafers face in substantially the same direction; (c) introducing a first reactant into the reaction space, wherein a portion of the first reactant is chemically adsorbed on the processing surface of each of the plurality of wafers; (d) diluting a non-chemically adsorbed portion of the first reactant in the single reaction space, wherein said introducing the first reactant is performed at a first pressure and said diluting the non-chemically adsorbed portion of the first reactant is performed to a second pressure, and wherein the second pressure is greater than the first pressure; (e) removing ~~a~~ the non-chemically adsorbed portion of the first reactant from the reaction space; (f) introducing a second reactant into the reaction space, wherein a portion of the second reactant is chemically adsorbed on the processing surface of each of the plurality of wafers; (g) diluting a non-chemically adsorbed portion of the second reactant in the single reaction

space; and (h) removing the non-chemically adsorbed portion of the second reactant from the reaction space, as recited in allowed claim 40.

The remaining claims further distinguish over the prior art.

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